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ABSTRACT

A study of the use of the complex Finnish morphological rule system in 45 children, aged 20-24 months, examined the children's inflection of nouns and verbs in speech characteristic of everyday Finnish. Analysis of the correct, unanswered, and incorrect test items found six classes of errors, which were then examined for clues to the underlying psychological processes of the children's speech. The subjects were divided into three speech achievement levels for further error pattern and rule application analysis. Results indicated that the children did not apply the same rule to all morphological forms, with rule selection seemingly guided by the morphological mastery level, form-specific variables, and contextual cues of the test items. It is concluded that further research in the interaction of these variables in different contexts is needed. (MSE)

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RULES IN CHILD LANGUAGE

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Some years ago professor Martti Takala actively commented on problems concerning the empirical verification and theoretical interpretation of cognitive developmental stages. For the following I will use his own words (Takala, 1981) as a starting point: "Stages as presented e.g., in Piagetian theory are too general to allow us to explain changes occurring in children's thinking."

Similar thoughts concerning stages and the specification of related concepts have been presented among child language researchers. According to Corrigan (1979, 1982), ambiguities associated with concepts and methods are especially present in research into the cognitive and language development of young children. Differing assumptions about cognitive stages, and differing criteria for assessing cognitive and linguistic skills, may account for some of the divergent research results. Experiments on children's linguistic competence (Warden, 1981), as well as those of cognitive development (Donaldson, 1978), have shown there to be very peculiar social situations. Therefore, an understanding of the relationship between language and cognitive development requires a precise specification of which cognitive behaviors correlate with which language skills, and more attention to details of task analysis and administration.

Most theories of language acquisition make use of the concept of stages or, alternatively, of rules in order to indicate the organized character of language learning. Stages generally carry an implication of a relatively fixed developmental sequence. The term of rule is regarded as less restrictive and less general, because the scope of rules is usually narrow and rules do not imply a requirement of development order. Both rule and stage concepts are useful in child language research. Baker and Derwing (1982) emphasize that the use of such terms presupposes a definition which proceeds from specific-to-general. From this perspective, rules might be seen as forming the first level of inspection in the specific content of child language. Thereafter the analysis would focus on discovering consistencies appearing in the use of the rules. If the sets of rules and operations included in them can be shown as appearing in an ordered sequence, they might provide information for an outlining of stages. According to Baker and Derwing (1982), one way to characterize a stage would be in terms of the rule or rules that are believed to be operative at a particular period of development.

In recent years the term rule has become very popular in a multiplicity of contexts. It appears in linguistics, psycholinguistics, learning theory, social and

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cognitive psychology. The meaning of this concept, however, varies and is in many cases used inconsistently. The need to make some distinctions is obvious. In this article an attempt is made to specify the use of the concept rule in the description of child language, especially in relation to the analysis of the development and acquisition of early morphology.

Operative rules

The notion of rule has been applied by researchers representing different theoretical perspectives. According to Chomsky (1965), a grammar is a system of rules which express the basic regularities of a language. Researchers starting from learning and cognitive theories have also used the concept of rule in their studies (e.g., Brown, 1973; Clark & Clark, 1977; Scandura, 1973).

The meaning of the rule, however, has varied, depending on the area where this concept is used. Especially, in linguistics rule usually refers to a way of describing a language product. Maratsos (1979, 1982), for example, describing "grammatical rules" and Schlesinger (1982) examining "relational rules." The main issue at stake with these rules is how the child express relations by means of word order and inflections. Using rule in this sense contains no implication that the rule can also be in causing the behavior (Baker & Derwing, 1982). Product descriptions are not psychologically so interesting, because they have no implication related to process explanations. The study of child language should be focused not only on products but also on the processes on which linguistic expressions are based (Clark & Hecht, 1983; Karmiloff-Smith, 1981).

Baker and Derwing (1982) present a process-oriented definition for rule, calling it an operative rule. This means that rules and operations included in them are regarded as psychological processes whose organization and ordering we try to specify and to demonstrate empirically. In this article the notion of rule is examined in that operative sense.

One way to obtain information about operative rules is to study children's linguistic errors (Brown, 1973; Clark & Clark, 1977; Maratsos, 1979). According to Siegler (1983), the clearest evidence that children's thinking is governed by rules involves the patterns of errors. Reorganizational processes and rule replacement seem to be particularly important linguistic behavior after the child has acquired a workable vocabulary and some basic ability at sentence construction (e.g., Bowerman, 1982). When reorganizing his language, the child produces overgeneralizations, omissions, substitutions and other incorrect forms which give a possibility of discovering rules induced and tentatively extracted by the child from his experience. Such reorganizational processes seem to be a meaningful part of language acquisition in richly inflected languages especially, such as Finnish (Lyytinen, 1982).

From a psychological point of view an important question is how we could discover operative rules which are included in the children's erroneous responses and which emerge as a consequence of the reorganizational processes described

above. Berko's (1958) method was one of the first ways invented to demonstrate rule-governed behavior in the use of English morphology. Berko's classic procedure has been regarded as a promising method to illustrate experimentally the child's ability to generate from a nonsense word an appropriate form according to a rule. The child's nonsense product gives evidence of how he understands the generality of the form to be inflected.

Data material collected by Berko's method has often been analysed by comparing the number of correct responses in different age groups. Baker and Derwing (1982) suggest that such an analysis is narrow and does not allow an identification of the operative rules underlying the children's products. They emphasize that chronological age is a poor independent variable for developmental work. Furthermore, not only the grammatical correctness aspect of the responses is worth consideration. When examining the acquisition of the English inflectional morphology for pluralization, Baker and Derwing divided the answers of 2 to 7-year-old children into six achievement groups and examined by cluster analysis incorrect response similarities within each subject group. They excluded from their analysis the children who had acquired an "adult pattern," because they constitute a group which contributes no information about evolving rules. Baker and Derwing believe that their analytical method, which focuses attention on the within-child response patterns, might provide an empirical approach to determine the rule systems used by children. They also suggest that such a methodology could be usefully extended to new situations in which rule-governed behavior is presumed to be the basis for performance.

In recent years researchers of child language have attempted to discover what factors facilitate or impede the child's search for linguistic regularities. The findings have revealed that rule selection is guided by, for example, the children's cognitive-developmental level (Clark, 1982; Corrigan & Di Paul, 1982; Lyytinen, 1983) and by such contextual variables as the semantic and grammatical properties of items and by the way of administering the tasks (e.g., Derwing & Baker, 1979; Lyytinen, 1982; Maratsos, 1982; Vogel, 1983; Warden, 1981). A further understanding of the processes underlying children's responses presupposes the use of analytical methods which allow an examination of interactions between these factors and which do not concentrate merely on a separate identification of variables (Rogoff, 1982). This approach might also produce new information about the process of rule learning (de Villiers, 1980) and individual variation (e.g., Kuczaj, 1982; Nelson, 1981) emerging as a consequence of differences in rule systems construed and applied by children.

Experimental evidence about operative rules in Finnish children

Finnish belongs to richly inflected languages and includes a very complicated morphological rule system. A free word-order, gradation in the stem, several cases, and verb-inflection in various persons are typical characteristics of the

Finnish language. Berko's procedure has been applied to an examination of the acquisition of morphological forms in Finnish 2 to 7 year-old children (Lyytinen, 1978, 1982, 1983). An analysis is made below of the responses produced by 20 to 24-month-old children (N 45, 24 girls and 21 boys) in the morphological test. Nine of the subjects (20 %) were excluded from the analysis because they did not have enough speech at the time for answering test items.

The test included items concerning the inflection of nouns (plural partitive, inessive, illative) and verbs (active present indicative). Words characteristic of the spoken language were used in the test items. The criteria for choosing the morphological forms were that they should consist of a representative sample of forms occurring in Finnish everyday speech and, especially, that the degree of their difficulty should be appropriate to the age group investigated.

The children's morphological test answers could be divided into three categories: correct answers (30.03 %), unanswered items (19.10 %) and erroneous responses (50.87 %). This article concentrates on analysing the category of the erroneous responses. Firstly, what kind of errors appearing in morphological test answers among 20 to 24-month-old children were examined. The following error types were found:

1. The child did not use a stimulus word or any other relevant utterance suitable for the item (included utterances "so it is," "yes, it is," "it is nice").
2. The child produced a stimulus word in the basic form without suffix (included utterances like "a flower" instead of "flowers," "a shoe" instead of "shoes," "a cup" instead of "into a cup").
3. The child described an action presented in a picture card, repeating the same words as in an instruction sentence (included utterances like "the boy goes" instead of "the boy goes into the car").
4. The child produced self-made suffixes (like "poikoja" instead of "poikia," "kukkeja" instead of "kukkia").
5. The child overgeneralized a suffix by using it in incorrect context (like "with the car" instead of "into the car").
6. The child reduced a stimulus word to a simple utterance like "here" instead of "in the bag." These utterances, however, included the correct suffix.
7. The child described an event with a new word but used the correct suffix (included utterances like "on the hair" instead of "on the head," "in the pouch" instead of "in the bag").
8. The child did not take account of consonantal gradation occurring in stem inflection (included utterances like "lammaita," "lammuja," "lamaita" instead of "lampaita").
9. The child changed one phoneme/syllable into another, or left a phoneme/syllables off a stem (included utterances like "keenuu" instead of "keinuu," "ökkiin" instead of "mökkiin").

These error types were compiled into six classes, as illustrated in Figure 1.

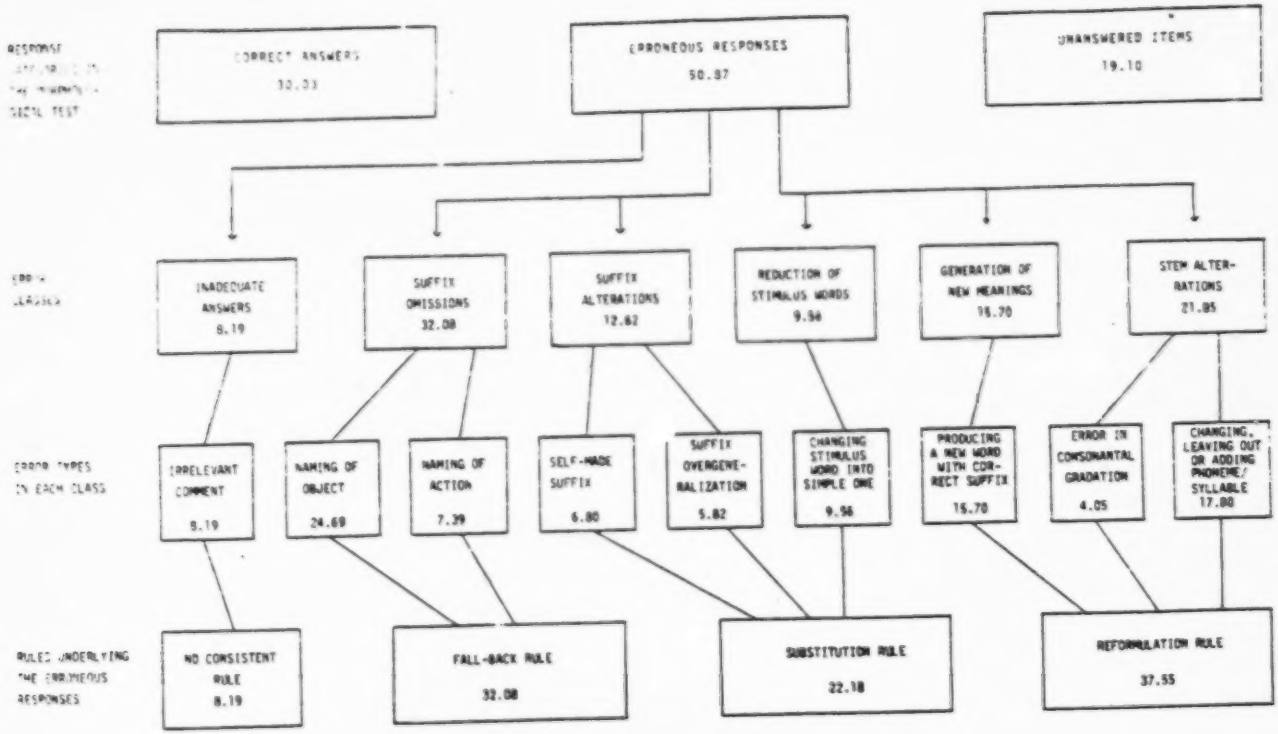

Figure 1. Classification of errors and related rules. Numbers display percentage distributions in the present empirical data.

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Rules guiding the children's answers in the morphological test

Each error type was examined separately in connection with the test items in order to discover the rules used by the children in their answers. The purpose of this analysis was to find out similarities between the children's different ways of responding to the particular test items and therefore reveal the psychological processes on which the child's speech product was based, i.e., which led the child to answer as he did. In Figure 1 the different rules used by 20 to 24-month-old children in the morphological test are outlined.

The child's inability to understand the instruction seemed to be the main reason for irrelevant comments. These answers did not include any consistent rule. In most cases the child only said something because he found the experimenter waiting for his answer. These responses offer no information about evolving linguistic rules. The children's behavior indicates that they had not then achieved a system for differentiating among the morphological test items.

The term fall-back rule has been used by Siegler (1983). In his view, the child may use a fall-back rule if, for instance, he is asked to compare objects on a dimension and he does not know how to do, therefore comparing them on the single seemingly most important dimension that he knows about. The naming responses in the present data represent such a fall-back rule. When the child did not know how to inflect a stimulus word he pointed to the object or action and named it. Naming is a very usual way to respond to pictures in the early phase of language development. Obviously, lacking the skills to inflect words as well as task-specific contextual variables may have led the child to use namings.

The use of the substitution rule indicated that the child had an idea about inflecting the stimulus word mentioned by the experimenter. When he did not find a correct inflection he substituted it by using the suffix of some other form, producing a self-made suffix or changing the stimulus word into a simple one. Substitution represents a way of compensating an inability to produce some particular morphological form.

The response guided reformulation rule was good answers in a grammatical sense because they included correct meaning and an adequate suffix; incorrectness was limited to stem inflection. Answers evoked in this way seemed to be related to the task-specific variables like the content category of the word and related associations, and the length and grammatical properties of the stimulus words. In the case of the substitution and reformulation rules, attentional and/or memory slips evoked by the test situation might also be one reason for the appearance of the rule.

Factors connected with the selection of the rules

Mastery level of early morphology. The use of rules was examined in groups representing different mastery levels of early morphology. Three achievement groups were formed on the basis of the number of correct scores obtained in the

Table 1. Appearance of rules in the different achievement groups

Achievement groups	Rules			
	Fall-back rule	Substitution rule	Reformulation rule	No consistent rule
LA group	43.42	21.26	20.04	15.28
MA group	29.60	23.86	40.71	5.83
HA group	12.11	16.53	71.36	–

morphological test. The scores achieved by the children in the LA group (low achievement) varied between 1—5, in the MA group (medium achievement) between 6—11 and in the HA group (high achievement) between 12—18.

As can be seen from Table 1, the percentages of the answers which did not include any consistent rule decreased as a function of the mastery of morphological forms. In the LA group the fall-back rule guided the children's answers more than the other rules. In the MA group, however, and especially in the HA group the underlying rule in the children's responses was the reformulation rule. In the use of the substitution rule the differences between the achievement groups were not so high, probably as a consequence of the young age of the subjects. Most 20 to 24-month-olds are acquiring inflections of their native language, and are therefore able only to a small extent to reorganize stimulus words. The findings concerning the other rules reveal, however, that the mastery level of inflections is one factor guiding rule selection in the production of morphological forms.

Morphological form-specificity. Table 2 indicates the percentages of correct answers and rules occurring in the children's erroneous responses with each morphological form examined separately.

Table 2 reveals that the fall-back rule was mostly applied to the plural partitive form. An examination of the plural partitive items showed that these included some specific features which might evoke the use of the fall-back rule. The items had been drawn so that there were two or more objects representing the same

Table 2. Appearance of rules in different morphological forms

Morphological forms	Correct answers	Rules underlying erroneous responses			
		Fall-back rule	Substitution rule	Reformulation rule	No consistent rule
Plural partitive	31.4	71.13	13.41	10.31	5.15
Inessive	48.6	16.42	41.79	35.82	5.97
Illative	44.3	14.09	33.89	42.26	9.86
Active present indicative	55.0	6.90	–	79.31	13.79

category in each picture (e.g., in one picture a shoe and in another three different shoes). Such test items activated the naming behavior typical of young children. Instead of plural partitive inflection many children pointed at each object of the test picture separately and named it by saying, for instance, "this is a shoe, a shoe and a shoe." The role of the contextual cues in the test items seemed to be essential in relation to the plural partitive form.

Substitution and reformulation rules guided the children's answers in the inessive and illative forms. An interesting finding was that the substitution rule did not occur at all in the active present indicative form. This result refers to the form-specificity of the rules used in the morphological test. In an earlier study conducted by the author (Lyytinen, 1982) the verb forms were found to mix with each other in 3 and 4-year-olds. Such mixing did not occur among 20 to 24-month-olds. The active present indicative form seemed to be only tense which the children had mastered at that period of language development. The reformulation rule was the prevailing rule-type which guided the children's incorrect answers in this verb form.

The use of the rules in the different morphological forms and achievement groups. An attempt was also made to investigate whether there were form-specific differences in the use of the rules among the different achievement groups. As can be seen from Table 3 the LA and MA groups produced irrelevant comments in the inessive, illative and active present indicative. These responses

Table 3. Distribution of the use of the rules in the different morphological forms and achievement groups

Morphological forms	Achievement groups	Rules: Fall-back rule		Substitution rule		Reformulation rule		No consistent rule
Plural partitive	LA group	100	***			—		—
	MA group	86.50	*	5.40	*	8.10		—
	HA group	37.93		37.93		24.14		—
Inessive	LA group	30.22		47.56	*	11.11	***	11.11
	MA group	10.00		53.34	**	23.33	***	13.33
	HA group	10.52		10.52		78.96		—
Illative	LA group	29.16		37.50		16.67	***	16.67
	MA group	16.68		36.66		36.66	**	10.00
	HA group	—		17.64		82.36		—
Active present indicative	LA group	14.29		—		52.38	**	33.33
	MA group	5.26		—		94.74	**	—
	HA group	—		—		100		—

* $p < .05$
** $p < .01$
*** $p < .001$

occurred mostly among the LA group in the present form, whereas irrelevant comments did not occur in the plural partitive in any group. This is an interesting finding because the mastery level of the plural partitive was the lowest and that of the present form the highest in the studied age group.

As earlier mentioned, the fall-back rule was applied mostly to the plural partive form and this was especially true in the LA and MA groups. The HA group used the substitution rule as often as the fall-back rule in the plural partitive. A general finding concerning the fall-back rule was that its use decreased as a function of the mastery of the morphology in all the forms under study. In the reformulation rule the observed trend was the opposite; the use of the rule increased as a function of the mastery level of morphology. The use of the substitution rule was interesting. Firstly, it did not occur in the verb form. Secondly, in this rule the connections with the mastery of morphology were not linear.

Concluding remarks

Ambiguities associated with concepts used in child language research have recently been under active discussion. This article has aimed at demonstrating how to make concept specifications in the content of early morphology. In the article an attempt was made to extract the rules included in the erroneous responses of 20 to 24-month-old children. The purpose was not only to describe linguistic products but also to shed some light on the underlying psychological processes which led the children to answer in a particular way to the different test items.

The data material was limited but allowed some opportunities of outlining the operative rules used by the children. The findings clearly indicated that the children did not apply same rule to all morphological forms. Rule selection seemed to be guided by the mastery level of morphology and form-specific variables and contextual cues of test items. Clark (1982), Derwing and Baker (1979) and Maratsos (1982) have earlier presented similar connections between rules and the semantic and grammatical complexity of the inflection. The results of the present descriptive examination revealed that more systematic studies are needed in the analysis of interactions between the effecting variables.

Process-oriented research of child language has emphasized the context-dependence of children's linguistic performances. Contextual factors can, however, vary in the same situation for different children. They may be associated with the child's learning history and experiences with tasks, with the child's cognitive level and motivational factors and with the nature and way of administration of the stimulus materials (e.g., Corrigan & Di Paul, 1982; Nelson, 1981; Warden, 1981). These factors together determine how the child understands and interprets the test-situation and the presented tasks. Therefore, we need knowledge about the interactions of these variables in different contents of child language. In this way we might have better opportunities of outlining

general features of contextual factors and their effects on the rule systems used by children in linguistic tasks.

The present examination of rules is only a first step in the attempt to define more closely concepts relevant for understanding the acquisition of early morphology. The aim is to continue analysis with more extensive data from 2 to 4-year-old children and to investigate the possibility of specifying some ordered sequences among rules. One important point to consider is Baker and Derwing's (1982) suggestion that by means of rule analysis we might characterize stages appearing in child language.

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